

Digestive System

Course

Principles of
Health Science

Unit XI

Anatomy &
Physiology

**Essential
Question**

What are the
tissues and
systems of the
human body?

TEKS

130.202 (c) 1D,
1E, 1G, 9B

**Prior Student
Learning**

n/a

Estimated time

1-2 hours

Rationale

To pursue a career in healthcare, proficiency in anatomy and physiology is vital.

Objectives

Upon completion of this lesson, the student will be able to:

- identify terms pertaining to the digestive system;
- list the major organs of the digestive system;
- recognize diseases and disorders of the digestive system; and
- label a diagram of the digestive system.

Engage

How does the digestive system work?

Key Points**I. Introduction**

- A. General function: the physical/chemical breakdown of foodstuffs so they can be absorbed into the bloodstream and used by the cells and tissues, and elimination of non-digestible substances produced during metabolism
- B. Digestion: the process of changing foodstuffs into usable substances
- C. Absorption: the transfer of nutrients into the blood stream
- D. Digestive processes
 1. Ingestion: the process of taking food into the digestive tract
 2. Propulsion: the process of moving food through the alimentary canal (swallowing, peristalsis)
 3. Mechanical digestion: the physical preparation of food for chemical digestion; mastication: the mixing of food with saliva by the tongue, churning and mixing of food in stomach, and segmentation in the intestines (rhythmic local constrictions of the intestine)
 4. Chemical digestion: the catabolic process in which large food molecules are broken down into smaller molecules by enzymatic hydrolysis (simple sugars, monosaccharides, glycogen, starch, amino acids, polypeptides, peptides, fatty acids, glycerol)
 5. Absorption: the transportation of digested end products from the GI tract into the capillaries and lymph vessels
 6. Defecation: the elimination of indigestible materials and waste

from the body

II. Parts of the digestive system

A. Mouth

1. The functions of the mouth are speech and the reception of food and preparation of it for digestion
2. Structures contained in the mouth
 - a. Tongue – used to speak and guide food, and contains taste buds which identify sweet, bitter, salty, and sour
 - b. Teeth – cut, grind, and tear food
 - 1) 20 baby teeth (deciduous)
 - 2) 32 permanent adult teeth
 - c. Three pairs of salivary glands (sublingual, parotid, and the submandibular – produce saliva, which dissolves food in the mouth. Saliva contains the enzyme ptyalin, which digests starch.
3. Pharynx (throat) – contains the tonsils, which are lymphatic tissues. The tonsils guard the entrance of the digestive and respiratory systems from bacterial invasion.
4. Esophagus – the tube connecting the pharynx and stomach. No digestion occurs in the esophagus
5. Stomach – receives swallowed food, secretes gastric juices, mixes food with gastric juices, and absorbs some drugs, water, and alcohol
6. Small intestine – completes the digestion of food begun in the stomach; the end products of digestion are absorbed into the blood and lymph
7. Large intestine – absorbs water and eliminates waste products of digestion through the anus
8. Accessory organs of the digestive system
 - a. Liver – secretes bile and forms antibodies
 - b. Gall bladder – stores and concentrates bile; ejects bile into the duodenum as needed during digestion
 - c. Pancreas – secretes pancreatic juices containing digestive enzymes. The pancreas also manufactures insulin which regulates glucose metabolism
 - d. Appendix – a small, blind tube extending from the large intestine at the junction of the small and large intestines. Its function is not understood.

B. Digestive juices

1. Saliva – contains the enzyme salivary amylase (ptyalin), which changes starch into double sugar
2. Gastric juice – contains hydrochloric acid and enzymes
 - a. The action of hydrochloric acid
 - 1) Softens connective tissues in meat
 - 2) Kills some pathogenic bacteria

- 3) Activates gastric enzymes
 - b. The action of enzymes
 - 1) Pepsin – begins protein digestion
 - 2) Lipase – digests fats
- 3. Pancreatic juice – contains enzymes
 - a. Amylopsin – acts on starches
 - b. Trypsin – acts on proteins
 - c. Lipase – acts on fats
- 4. Intestinal juice – contains enzymes
 - a. Lactase – changes complex sugars into simple sugars
 - b. Maltase – changes complex sugars into simple sugars
 - c. Sucrase – changes complex sugars into simple sugars
- C. Disorders and diseases of the digestive system
 - 1. Mouth and teeth
 - a. Dental caries – tooth decay
 - b. Gingivitis – inflammation of the gums
 - c. Mumps – a viral infection of the salivary glands
 - d. Pyorrhea – inflammation of tooth sockets
 - e. Stomatitis – inflammation of the lining of the mouth
 - 2. Stomach
 - a. Flatulence – excessive amount of gas in the stomach or intestine
 - b. Gastritis – inflammation of the lining of the stomach
 - c. Heartburn – a burning sensation in the anterior part of the stomach
 - d. Nausea – stomach distress with an urge to vomit
 - e. Ulcer – an area of the lining of the stomach or small intestine in which the tissues are gradually disintegrating
 - f. Vomiting – reverse peristalsis causing ejection of the stomach contents through the mouth
 - 3. Small and large intestine
 - a. Appendicitis – inflammation of the appendix
 - b. Constipation – abnormal delay in, or infrequent bowel movement
 - c. Diarrhea – abnormally frequent, watery bowel movements
 - d. Dysentery – inflammation of the lining of the intestines accompanied by diarrhea
 - 4. Liver
 - a. Cirrhosis – a chronic disease in which normal liver cells are replaced by scar tissue
 - b. Hepatitis – inflammation of the liver
 - 5. Gall bladder
 - a. Cholecystitis – inflammation of the gall bladder
 - b. Cholelithiasis – the presence of stones in the gall bladder
 - 6. Pancreas
 - a. Diabetes – a disease in which sugar is not used by the

- cells because of lack of insulin. This is not a digestive disorder.
- b. Pancreatitis – inflammation of the pancreas

Activity

- I. Build a model of the digestive system. See Activity Sheet.
- II. Complete the Digestive Man project.
- III. Label the Human Digestive System.
- IV. Participate in Digestion Sing-a-long.

Assessment

Successful completion of a digestive system model.
Successful completion of digestive man.

Materials

Flexible straws
Masking tape
Balloons
Scissors
Various colors of ribbon
Human digestive system diagram

Accommodations for Learning Differences

For reinforcement, the student will label a diagram of the digestive system.

For enrichment, the students research and report on the major enzymes involved in digestion, their source, and actions. Explain what might happen if enzymes were not present.

National and State Education Standards

National Health Science Cluster Standards

HLC01.01 Academic Foundations

Health care workers will know the academic subject matter required (in addition to state high school graduation requirements) for proficiency within their area. They will use this knowledge as needed in their role.

HLC10.01 Technical Skills

Health Care Workers will apply technical skills required for all career specialties. They will demonstrate skills and knowledge as appropriate.

TEKS

130.202 (c)(1)(D) organize, compile, and write ideas into reports and summaries;

130.202 (c)(1)(E) plan and prepare effective oral presentations; and

130.202 (c)(1)(G) describe biological and chemical processes that maintain homeostasis.

130.202 (c)(9)(B) identify wellness strategies for the prevention of disease.

Texas College and Career Readiness Standards

English Language Arts

II. B. Understand new vocabulary and concepts and use them accurately in reading writing and speaking.

III. B. Develop effective speaking styles for both group and one on one situations.

IV. A. Apply listening skills as an individual and as a member of a group in a variety of settings.

IV. B. 2. Listen actively and effectively in one-on-one communication situations.

Science

1.E.1. Use several modes of expression to describe or characterize natural patterns and phenomena. These modes of expression include narrative, numerical, graphical, pictorial, symbolic, and kinesthetic.

1.E.2. Use essential vocabulary of the discipline being studied.

3.A.1. Use correct applications of writing practices in scientific communication.

Building a Digestive System

Objective:

Students will understand the parts of the digestive system.

Materials:

6 or more flexible straws

1 roll of masking tape

1 balloon

Scissors

Strategy:

Students will work individually.

1. Using one of the drinking straws, have the student join the straight end of the straw to the opening of the balloon and tape it in place. This will represent the esophagus and the stomach.
2. With the scissors, create a small opening in the body of the balloon and insert another straw. Where the straw connects with the balloon becomes the pyloric sphincter, etc.
3. Join the remaining drinking straws end-to-end using the masking tape.
4. Students will then tape the straws and curve them to resemble the curves associated with the intestinal curvature.
5. Finally, the students will appropriately label the digestive system structures.

Digestive Sing-a-long

Objective:

Students will review and reinforce what they learned about the digestive system by singing the following song in class.

Strategy:

Copy the words of the song for the students, and have the entire class sing the words.

Optional: You may make an assignment for the students to make up their own song to the tune of their choice, and perform it for the class or have the entire class sing with them.

DIGESTIVE CHRISTMAS to the tune of "Silver Bells"

Put tomăto in stomat/o
Put ondont/o to work;
Add sial/o to form a nice bolus.
Push with gloss/o to pharyng/o
Deglutition takes place
Down esophag/o to gastr/o- it's here!
After time, slimey chyme
Slips right on through the pylorus.
Duoden/o, then jejun/o,
Soon it is ile/o time!
Now the cec/o, past appendic/o
Up ascending col/o,
'Cross the transverse, descending, goes feces.
Now sigmoid/o, to the rect/o,
To the an/o and then –
Anal sphincter takes over from there.
Christmas time
Is a time
We celebrate with digestion.
Now we know
Where it goes
(In) medical terms all the way!

Contributed by Clearfield High School

Digestive Man

The average man is 6 foot tall and has 30 feet of digestive tract, using Math conversions figure what each of the sections would look like on your 17 inch man (show work).

Mouth on a 6 foot man is 7 inches for a 17 inch man it would be

Esophagus on a 6 foot man is 10 inches: on a 17 inch man

Stomach on a 6 foot man is 27 inches: on a 17 inch man

Small Intestines broken down to:

Duodenum 12 inches

Jejunum 8 feet

Ileum 13 feet

Large Intestines/ Colon broken down to:

Ascending + cecum 1 foot

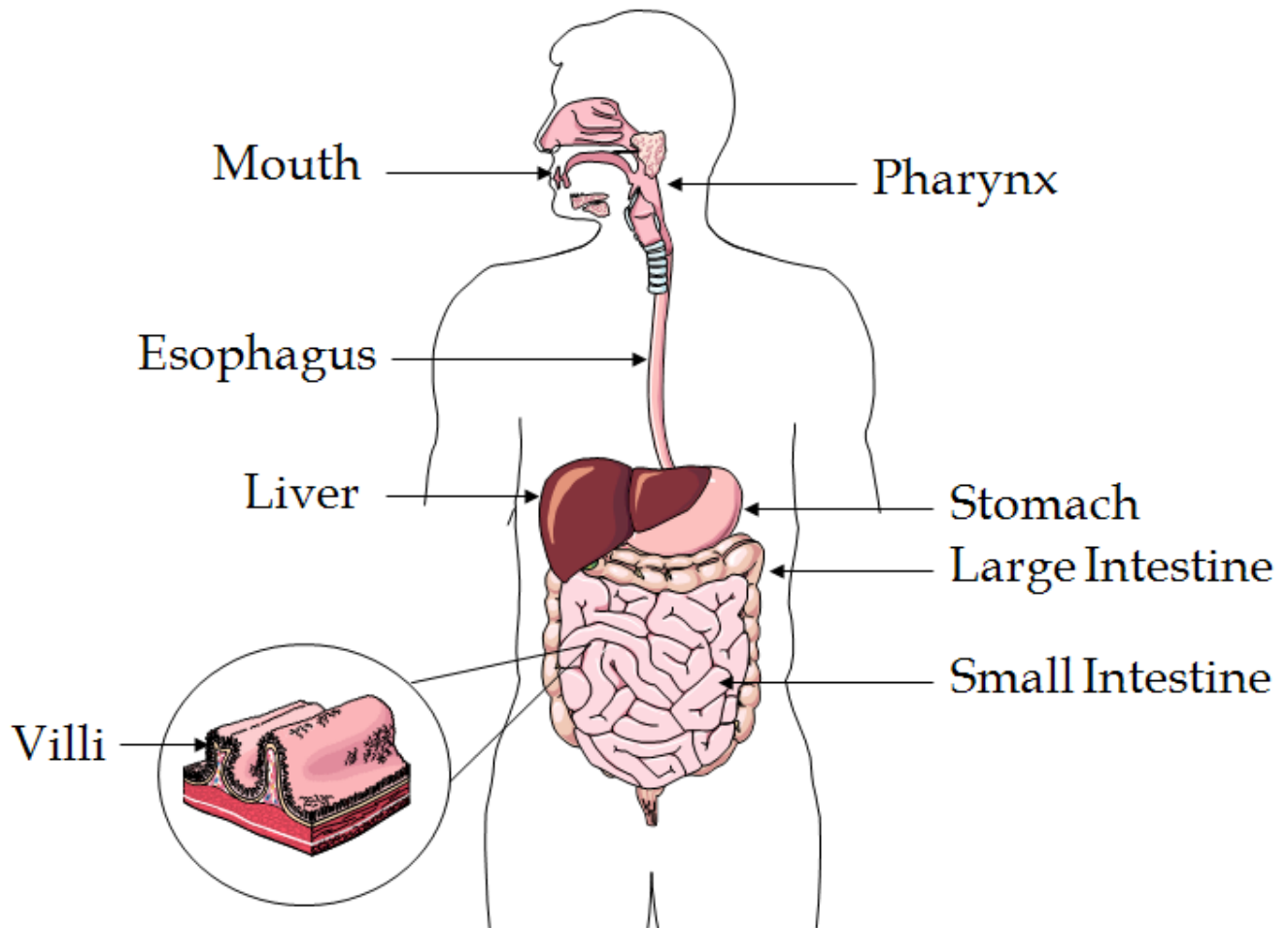
Transverse 2 foot

Descending 1 foot

Rectum 6 inches

After completing the above problems, with a partner, make the digestive system using ribbon to show how compacted the digestive system would be on your 17 inch man. Change ribbon color with part.

Human Digestive System



Label the Human Digestive System

